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## MD-PhD Training: Pursuing a Career as a Physician-Scientist

If you are interested in combining research with a medical career, you may want to consider an MD-PhD program. The University of Toronto's Faculty of Medicine offers an MD-PhD training program for future physician-scientists; students in the program receive training in both research and medicine. Career paths following graduation generally include a combination of research and patient care, with a faculty appointment in a research institute, university or medical school setting

Some important points to consider:

- The competition for acceptance into an MD-PhD program is fierce. Applicants with extensive and distinguished research experience are preferred, particularly those that show an interest in translational research.



Pipet: By [ponsulak](#), published on 01 November 2011  
Stock Photo - image ID: 10063035. Docotr: By [stockimages](#), published on 14 November 2012

November 2013

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- A career in medical research is also possible with an MD or PhD only, although patient care is not possible in the latter case. Keep in mind that your application should highlight why you feel both degrees are essential to what you would like to accomplish.
- The MD-PhD track is unique in that it combines two careers. The training is long and rigorous, and most programs take 8-9 years to complete with an additional 3-7 years for specialty and sub-specialty training, which includes residencies and/or fellowships. Take the time to carefully explore whether the physician-scientist track is right for you.
- Though the time commitment can be severe during training, these years provide abundant professional and personal growth, and career progress after graduation is often quick.
- The financial burden of pursuing an MD-PhD program can be heavy. Tuition costs are high, and are spread out over many years. However, most MD-PhD programs offer student stipends and scholarships to help support the cost of living and tuition. For example, the University of Toronto's MD-PhD program is committed to providing \$30,000 per year in financial support from a variety of sources.
- Consider the challenges of juggling two careers. Research and medical practice are demanding and challenging careers on their own; if you combine both you will be extremely busy, which may affect your work-life balance.
- Physician-scientists have unique challenges, opportunities and rewards. The ability to care for patients while working to understand and find new treatments for diseases can be extremely gratifying. There are very few alternative careers that offer a similar experience.

For additional information, please explore the following resources:

- <http://mdphd.utoronto.ca>
- <http://mdphds.org/guide/intro.php>
- [http://sciencecareers.sciencemag.org/career\\_magazine/previous\\_issues/articles/2003\\_10\\_31/nodoi.16083605582833029302](http://sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2003_10_31/nodoi.16083605582833029302)

Author of this summary: Dr. Iris Kulbatski, Science Writer, ORT

## MD-PhD Trainee Interview

To gain a better understanding of what it's like to go through an MD-PhD program, the ORT spoke to Dr. Marko Skrtic, a student enrolled in the MD-PhD program at the University of Toronto (U of T), who completed his doctoral research under supervision of Dr. Aaron Schimmer at OCI.

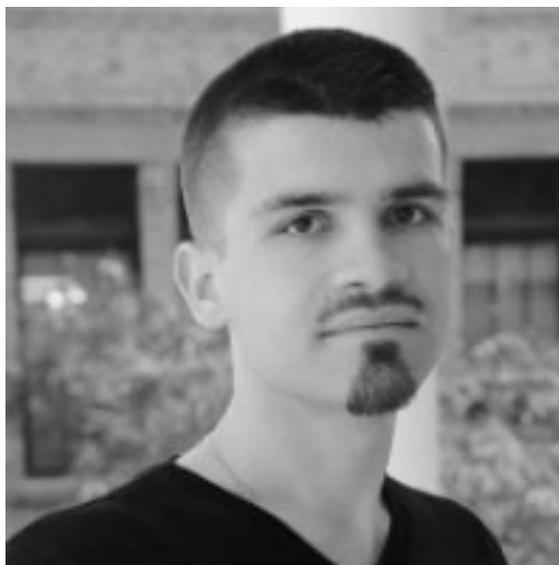
### Marko's path through the MD-PhD program

Dr. Marko Skrtic entered U of T's MD-PhD program in September 2007. Similar to other MD-PhD trainees, Marko completed one and a half years of medical school before putting his clinical training on hold to work on his doctoral research project under the supervision of Dr. Schimmer.

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Dr. Schimmer was an ideal mentor for Marko, given he is himself a clinician-scientist who sees leukemia patients and leads a successful research program aimed at developing novel therapies to treat leukemia. For his doctoral research, Marko and his colleagues conducted a high-throughput screen of FDA-approved, on- and off-patent compounds to identify those that are toxic to leukemic cells but not normal blood cells. They showed that Tigecycline, a broad-spectrum antibiotic, is a potent inhibitor of protein translation in the mitochondria of leukemic cells. Marko's hard work led to a first-author publication in the prestigious journal [Cancer Cell](#). Tigecycline is currently being tested as a new treatment for acute myeloid leukemia in a phase I clinical trial.



Marko defended his PhD in the summer of 2012 and “reintegrated” into medical school, exactly at the point where he had left off four years earlier. During the summer between his second and third year of medical school, Marko conducted a research project in Dr. Gelareh Zadeh’s lab at TMDT where he investigated the different metabolic components of an aggressive type of brain tumour, known as a glioblastoma. Currently, Marko is entering his fourth and final year of medical school and is expecting to graduate in the spring of 2014.

### **What are the differences between the PhD component of an MD-PhD program and a PhD program?**

According to Marko, there are no differences between the requirements and expectations for students in the MD-PhD and PhD programs. Although not required by his MD-PhD program, Dr. Schimmer and Marko felt it was important for Marko to continue working with patients and keep his hands warm in clinical skills while conducting his doctoral research. Consequently, under the supervision of Dr. Mark Minden, Marko participated in a clinic once per week where he followed up with leukemia patients after their treatments.

### **Do trainees in MD-PhD program do predominantly basic or clinical research?**

The vast majority of students conduct basic research projects, however, the number of students interested in clinical or social medicine is increasing. Marko knows of one student currently completing a PhD in the philosophy of medicine.

### **Marko’s career ambitions**

This fall Marko will be applying to residency programs in internal medicine, during which he will specialize in hematology or nephrology. After his five to six years of residency, Marko plans to conduct one to two postdoctoral fellowships in basic science to help him attain his goal of becoming a clinician-scientist and leading his own scientific group, to follow in the footsteps of his mentor Dr. Schimmer.

### **Is a postdoctoral fellowship necessary?**

Given the competitive nature of academic medicine and research funding, Marko thinks most clinician-scientists must do at least one postdoctoral fellowship, to obtain additional scientific expertise and connections, before securing a faculty appointment.

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### What are the challenges of integrating clinical and research training?

Marko thinks that is very difficult to integrate both clinical and research training. As most graduate students and postdoctoral fellows already know, a trainee must be fully committed to their research to succeed; it is very difficult for MD-PhD trainees to continue their clinical training while conducting their doctoral and postdoctoral research projects. Some trainees, like Marko, have the option of participating in 1-2 clinics per week to maintain their clinical skills. The MD-PhD program allows trainees some flexibility, in that they customize their training according to their career goals. Trainees wishing to become clinician-scientists do not necessarily have to participate in MD-PhD training programs, instead they can complete their doctoral research and medical training separately—some choose to do their PhDs first, then attend medical school. In contrast, Dr. Schimmer completed his medical training and residency before embarking on his research training. There are multiple paths that lead to clinician-scientist positions; the one taken by trainees is a personal choice.



### Mitacs Step Workshops

**Mitacs** is a private, national, not-for-profit organization that is funded by the federal and provincial governments. Several Mitacs research and training programs exist to support the development of future innovators in all areas of applied research.

In particular, Mitacs

- Helps companies identify their innovation needs and matches them with academic expertise;
- Fosters cutting edge research tied to commercial outcomes;
- Builds international research networks, creating innovation leaders in Canada and abroad; and
- **Provides professional and entrepreneurship skills training for graduate students and post-doctoral fellows, so they have the tools to meet emerging innovation needs.**

**MITACS** Workshops are offered in the following key areas:

Basics of Business Environment, Communication, Basics of Entrepreneurial Thinking, Project Management

**Coming up:**

***Practice your presentation skills I, Dec 2, 2013, Ryerson University***

***Essentials of Productive Teams, Dec 13<sup>th</sup>, 2013, York University***

Click <http://step.mitacs.ca/workshop-catalogue> for registration information.

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# Welcome Nimerta!

The current interim coordinator of the ORT Times—Carrie-Lynn Keiski—will be leaving us to take a new position in Research Communications at UHN. We wish her much success in this new endeavour. Nimerta Rajwans will be the acting interim coordinator until Pricilla De Luca returns from maternity leave.

## Here's a little about Nimerta written by Nimerta...

Allow me to introduce myself, my name is Nimerta Rajwans and I will be acting as the interim coordinator for the Office of Research Trainees.

My career in research began after I graduated with a B.Sc. in Biochemistry from Concordia University when I obtained a research position in a prostate cancer lab at McGill University. I spent 4 years working in that lab and found that the hands-on learning in that environment taught me more than I had learned during my entire undergraduate career.

When I moved from Montreal to Toronto, I wanted to continue my career in research. I started working in Dr. Marc Perry's lab at the University of Toronto where we studied cell fate determination in *C. elegans* male sex determination. Even though I was "playing with worms", I enjoyed the research so much that I decided to apply to graduate school after 11 years in the workforce. I completed a Master's degree in the Department of Molecular Genetics at the University of Toronto. At this point, I wanted to do something more applied and accepted a position as the lab manager of the Sandra Rotman Labs with Dr. Conrad Liles (my primary supervisor) and Dr. Kevin Kain at Toronto General Hospital. Initially I worked on a project using the HUVEC endothelial cell line as a model to investigate intracellular mechanisms of endothelial cell activation (a proinflammatory response of endothelial cells) and to identify biological agents that could inhibit this process. As time went on, I became more involved in projects aimed at identifying biomarkers in infectious diseases such as malaria, sepsis, Dengue fever and HIV. The ultimate goal of these projects was to improve our ability to better predict clinical outcomes by measuring one or a combination of these proteins in the blood of individuals with specific infections.

My time spent doing global health research was the most enjoyable of all of my work experiences. I had an opportunity to travel to Bogota, Colombia, to help conduct a study on Dengue fever. It was always fascinating to hear about the travels of my labmates to East Africa where they conducted research, practiced medicine and ran a clinical trial. It was exciting and rewarding to see the discoveries made in the lab being applied in the field.

It was therefore a sad time when Dr. Liles decided to move his research back to the University of Washington in Seattle. This is what brings me to be the Interim Coordinator for the Office of Research Trainees. I am ready to try something other than bench work and look forward to acquiring new skills. Having been in research for so long, I believe that I understand the needs and concerns of many trainees and thus hope to be a valuable asset to the Office of Research Trainees (ORT) in a capacity other than wet lab research. I look forward to working with the team here and to contributing to the exciting initiatives in the ORT.



# conference reports

**Trainee:** Diana Frasca, PhD candidate  
**Supervisor:** Dr. Robin Green , TRI  
**Conference:** Brain Injury Association of Canada Annual Conference  
Sept 25-27, 2013, Kingston, Ont.  
**Abstract Title:** Socializing, learning and working after traumatic brain injury: A review of the science, opportunities for intervention, and the potential of environmental enrichment

Click [here](#) to read Diana's conference report



**Trainee:** Fernando A. Angarita, MD, M.Sc candidate  
**Supervisors:** Dr. Andrea McCart, TGRI

**Conference:** Canadian Surgery Form, Sept 19<sup>th</sup>-22, 2013, Ottawa, Ontario

**Abstract Title:** Using oncolytic virus therapy against precancerous colonic lesions women

Click [here](#) to read Fernando's conference report

**Trainee:** Dr. Julie Trudel, Post-doctoral fellow  
**Supervisor:** Dr. Doris Howell , OCI  
**Conference:** International Conference on Communication in Healthcare 2013, September 29<sup>th</sup>-October 2<sup>nd</sup>, 2013, Montréal, Québec  
**Abstract Title:** Influence of Patient-Centered Communication (PCC) on perceptions of illness, self-efficacy for coping behaviors and psychological distress in breast cancer

Click [here](#) to read Julie's conference report.



**Trainee:** Yu-Jia Shiah, M.Sc candidate

**Supervisors:** Dr. Rama Khokha, OCI

**Conference:** Advances in Breast Cancer Research: Genetics, Biology, and Clinical Applications, Oct 3<sup>rd</sup>-6<sup>th</sup>, 2013, San Diego, CA, USA

**Abstract Title:** Identifying molecular programs of progesterone-driven mammary stem cell expansion

Click [here](#) to read Yu-Jia's conference report.

## UHN Trainee Katie Fraser is developing a new computer program to help diagnose and study aphasia

When I was 11 years old, my stepmother Ginny was diagnosed with a cerebral aneurysm. After three failed surgeries in Sudbury, she was sent to Toronto Western Hospital where a neurosurgeon finally closed the tiny bleed in her brain that was causing so much havoc. During this experimental surgery, Ginny suffered a stroke that damaged the left side of her brain, paralyzing the right side of her body and severely impairing her ability to speak. Ginny had difficulties producing the correct words and stringing words together into cogent sentences; these symptoms are defining features of a speech disorder known as Broca's aphasia.

### Aphasia—a debilitating symptom of brain damage

Aphasia is a communication disorder caused by damage to the brain that interferes with a person's ability to speak and/or comprehend spoken or written text. It can be extremely debilitating. The most common sources of brain damage that lead to aphasia are stroke, infection, injury, tumour or neurodegenerative disease. Different subtypes of aphasia exist and are defined by the source and location of brain damage, as well as how the damage affects a person's communication and comprehension skills. Proper diagnosis can be a labour-intensive and expensive process, requiring a battery of cognitive and language function tests, administered by a clinical neuropsychologist or speech language pathologist.



### Building a novel computer program to diagnose aphasia

To make the diagnosis of aphasia faster and easier, Katie Fraser, a PhD candidate working at UHN, and her colleagues are developing computational methods to analyze speech samples produced by different people and identify, with a high level of accuracy, which individuals are afflicted by aphasia and what kind of aphasia.

To help achieve this goal, Katie is being guided by several experts in the field. Dr. Elizabeth Rochon, a senior scientist at TRI and expert in speech, language and dementia, is a member of Katie's supervisory committee. Katie is also a member of the Communication Research Team at TRI. Katie's primary supervisor, Dr. Graeme Hirst, is a computer scientist who gained attention in 2009 for analyzing the word and phrase usage in books written by Agatha Christie throughout her 54-year career. Based on the results, Dr. Hirst and his colleagues concluded that it is highly likely that Agatha Christie suffered from Alzheimer's disease toward the end of her writing career. Follow this [link](#) to read a short summary of the study published in the New York Times.

### Investigating features that distinguish normal and aphasic speech

Katie obtained transcripts of patients with primary progressive aphasia (PPA), which is one type of frontotemporal dementia, and healthy controls, each telling the Cinderella story. Using specialized software, Katie analyzed different text features of the transcripts, such as the number of words, number of sentences, frequency of nouns and number of “um”s used by the speaker. She identified the text features that differed the most between healthy controls and patients with PPA, as well as between patients with two different subtypes of PPA: semantic dementia (SD) and progressive non-fluent aphasia (PNFA).

# latest and greatest trainee publications

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Using this information, Katie developed a computer program to analyze transcripts of speech samples and differentiate between patients with SD and PNFA with an accuracy of up to 79% and between healthy and PPA patients with an accuracy of up to 100%. These results were published in the journal *Cortex* in December 2012. Follow this [link](#) to read the abstract.

## **Katie's award-winning paper presented at Interspeech 2013 in Lyon, France.**

This summer Katie won an award for publishing the best student paper at Interspeech 2013—the Annual Conference of the International Speech Communication Association—in Lyon, France. In her award-winning paper, Katie again analyzed the voice recordings of people telling the Cinderella story, this time to identify the acoustic features that differed the most between healthy controls and patients with aphasia. Examples of acoustic features include how often the speaker pauses, the average length of the pauses and the jitter—a measure of the average difference in the pitch of speech. Katie found that her computer program could differentiate between healthy controls and patients with PPA with a higher level of accuracy when both text and acoustic features were included in the analysis. Surprisingly, only one acoustic feature was found to be significantly different between the voice recordings of SD and PNFA patients.



When I spoke to Katie, she emphasized that her computer program is not meant to replace the assessments carried out by clinical neuropsychologists or speech language pathologists. Instead, it is meant to be used as a tool by these clinicians to help diagnose patients faster and earlier, monitor the progression of their disease and measure the impact of an intervention of their speech.

Thanks to several years of verbal and physical therapy, the stroke has left few noticeable traces on Ginny, including her speech; no one can tell she suffered from aphasia twenty five years ago, unless they are told. The novel computational methods being developed by Katie and her supervisors have the potential to help clinicians and scientists better diagnose and help people with aphasia like Ginny.

## **Interview with Katie**

ORT asked Katie a few questions related to her paper. Click on the questions to read Katie's answers.

## **[What is Interspeech?](#)**

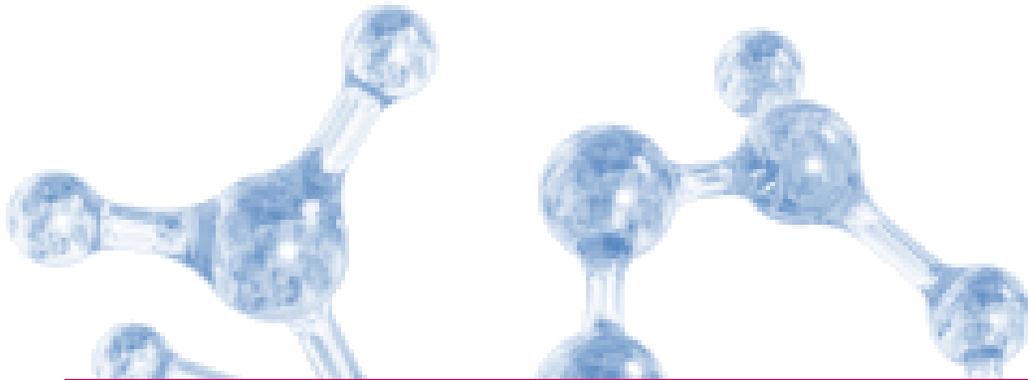
## **[Describe your training path.](#)**

### References

Fraser KC, Meltzer JA, Graham NL, Leonard C, Hirst G, Black SE and E Rochon. Automated classification of primary progressive aphasia subtypes from narrative speech transcripts. 2012. *Cortex* Dec 21. pii: S0010-9452(12)00341-3. doi: 10.1016/j.cortex.2012.12.006. [Epub ahead of print]Fraser KC, Rudzicz F and E Rochon. Using text and acoustic features to diagnose progressive aphasia and its subtypes. *Proceedings of Interspeech 2013*, August 25-29, Lyon, FranceFact-sheet: Aphasia. US National Institutes of Health - National Institute on Deafness and Other Communication Disorders. Publication No. 08-4232. Updated October 2008. <https://www.nidcd.nih.gov/staticresources/health/voice/FactSheetAphasia.pdf>

Author of this summary: Dr. Carrie-Lynn Keiski, ORT

# alumna career profile



**Dr. Maria Pasic, PhD**

**Clinical Biochemist**

**St. Joseph's Health Centre**

## **What did you study in university and where did you study?**

Undergraduate: Human Biology and Physiology (University of Toronto)

Graduate (PhD): Medical Sciences (McMaster University)

Post-Graduate: Diploma in Clinical Chemistry (University of Toronto/UHN)

## **What did you work on at UHN?**

I worked with Dr. Suzanne Kamel-Reid in the Molecular Diagnostics lab. I was using a Mass Spectrometry-based genotyping platform to create a test panel for inherited disease mutations. If validated, this could be used in the future for high-throughput analysis of many genes that cause inherited disorders including thrombosis, hemochromatosis and amyloidosis

## **What is a Clinical Biochemist?**

A clinical biochemist is the core biochemistry lab director in a hospital or private lab setting. I oversee all aspects of patient blood testing, from receipt by the lab to reporting of results. The goal is to ensure that the results going back to clinicians are of the highest accuracy and quality, to ensure the best patient management. In addition, I evaluate new laboratory instrumentation, introduce new tests to our menu, consult with clinicians, sign out interpretive lab reports, and play a role in teaching lab staff, clinical chemistry trainees, and medical students.

## **What is a typical day like for you?**

Every day I do a walk-through of the lab and identify any issues or matters requiring my attention. These may include instrument malfunction, problems with the precision or accuracy of our testing, special requests from clinicians, signing out lab quality assessment forms, etc. I attend medical rounds, prepare teaching materials for students or lab trainees, and read new literature on laboratory methods and instrumentation. I also often meet with vendors, attend hospital management meetings, consult with other clinical chemists about collaborative testing, and call clinicians to discuss unique cases and test results.

Click [here](#) to read the remainder of Maria's interview and learn what advice she has for trainees interested in pursuing a similar career path.



# UPCOMING EVENTS & FUNDING CALENDAR:

**11/26** **TRI Research Day**  
 Keynote Speaker : Bob McDonald, host of the award-winning CBC radio science program **Quirks & Quarks** and science journalist.  
 Time: 8:45 a.m. - 3:30 p.m.  
 Location: Chestnut Conference Centre , University of Toronto, 89 Chestnut Street  
 Questions? Contact: [TRI-ResearchDay@uhn.ca](mailto:TRI-ResearchDay@uhn.ca)

**12/01** **CIHR Master's Award APPLICATION DEADLINE**  
 Master's Award: Frederick Banting and Charles Best Canada Graduate Scholarships  
 To learn more about this award click [here](#).

**12/19** **FY13 DoD – Breast Cancer Research Program – Postdoctoral Fellowship Award PRE-APPLICATION DEADLINE**  
 Purpose: The Postdoctoral Fellowship Award supports exceptionally talented recent doctoral or medical graduates in pursuit of innovative, high-impact breast cancer research during their post-doctoral training and allows them to obtain the necessary experience for an independent career at the forefront of breast cancer Research.  
 More information: <http://cdmrp.army.mil/funding/bcrp.shtml>

Visit [www.uhntrainees.ca](http://www.uhntrainees.ca) for more events and funding information.

## QUESTIONS?

Please contact:  
 ORT Interim Coordinator  
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 t. 416-946-2996



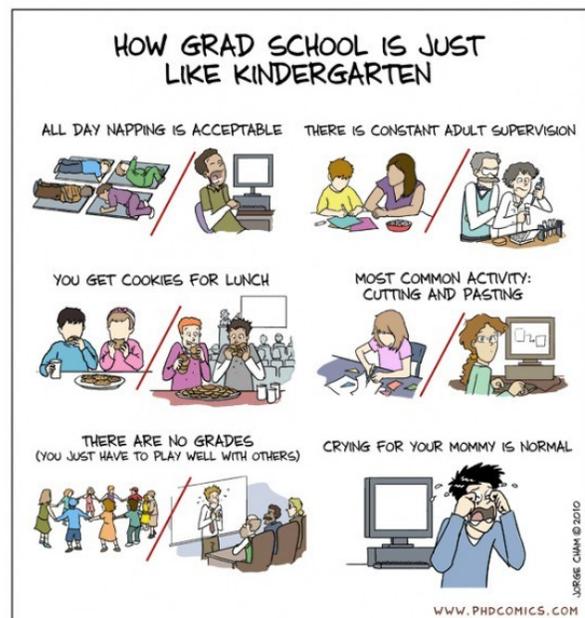
### FOOD FOR THOUGHT

If you are craving great sushi one lunch hour, a great place to try is Etsu. Décor is simple and elegant, food is fantastic and service is great. Prices are super reasonable for fairly large portions. Etsu is located at 45 Baldwin Street, just a hop skip and jump away.

Tel: 416 599-4200

Enjoy!

### Graduate school according to PhD Comics.



"Piled Higher and Deeper" by Jorge Cham [www.phdcomics.com](http://www.phdcomics.com)